

REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1-21 are currently pending in this application. Claims 3-20 have been withdrawn from further consideration by the Examiner. No claims have been amended. Accordingly, no new matter has been added.

At the outset, the present application is believed to be in condition for allowance. Entry of the accompanying amendment is requested under 37 C.F.R. §1.116, as the amendment does not raise any new issues which would require further search and/or consideration by the Examiner. Furthermore, Applicants request entry of this amendment in order to place the claims in better form for consideration on Appeal.

In view of the remarks herein, Applicants respectfully request that the Examiner withdraw all outstanding rejections and allow the currently pending claims.

Issues Under 35 U.S.C. § 103(a)

Claims 1-2 and 21 stand rejected under 35 U.S.C. 103(a) as being obvious over Awano (U.S. 7,084,507) (hereinafter Awano '507) in view of Webster (Wiley Encyclopedia of Electrical and Electronics Engineering). Applicants respectfully traverse.

The Examiner reaffirms his previous position that Awano '507 teaches "device formation of wiring structure including metal and an intervening carbon nanotube". The Examiner acknowledges that Awano '507 does not explicitly recite the use of a semiconductor material in which the device component includes an organic semiconductor material having a 6-membered carbon ring, and relies on Webster to overcome the deficiencies of Awano '507.

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, there must be a reason why one of ordinary skill in the art would modify the reference or combine reference teachings to obtain the invention. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). There must be a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* The Supreme Court of the United States has recently held that the "teaching, suggestion, motivation test" is a valid test for obviousness, albeit one which cannot be too rigidly applied. *Id.* Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *Id.*

The Examiner states that Figure 19C of Awano '507 shows a drain electrode 222 in contact with the carbon nanotube 220a, wherein the carbon nanotube 220a contacts the component regions in substrate 202. The Examiner further asserts that one skilled in the art would be motivated to employ Webster's 6-membered ring as the semiconductor material of Awano '507. Applicants respectfully and strongly disagree.

Awano '507 is directed to an integrated circuit device having vias for interconnecting wiring lines in separate layers, wherein the vias are made of nanotubes. Awano '507, however,

fails to teach or suggest each and every limitation of the present invention. Webster fails to cure the deficiencies of Awano '507.

For instance, the carbon nanotube of Awano '507 does not simultaneously contact a metal and an organic material. The growth of the carbon nanotube in Figure 19C of Awano '507 is carried out by using a catalyst (see col. 17, lines 27-31). As a result, the carbon nanotube grows on the catalyst and does not contact the substrate. In contrast, the present invention requires that the carbon nanotube contacts both a metal and an organic material comprising a 6-membered carbon ring. Webster also fails to teach or suggest a carbon nanotube in contact with a metal and an organic material comprising a 6-membered carbon ring.

Clearly, the prior art of record fails to teach or suggest each and every limitation of the present invention. For this reason alone, the present rejection is improper and should be withdrawn.

Moreover, Applicants submit that references cannot be arbitrarily combined. There must be some reason why one of ordinary skill in the art would be motivated to make the proposed combination of the primary and secondary references. *In re Nomiya*, 184 USPQ 607 (CCPA 1975). Courts have clearly established that, even when a combination of references teaches every element of a claimed invention, a rejection based on a *prima facie* case of obviousness is improper absent a motivation to combine. *In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998). In addition, if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, there is no motivation to make the proposed modification (see MPEP 2143.01).

As evidenced by the enclosed Declaration Under 37 C.F.R. 1.132, it is impossible to replace substrate 202 of Awano '507 with an organic material having a 6-membered carbon ring. As discussed in the Declaration, it is not possible to grow a carbon nanotube on a substrate of an organic material having a 6-membered carbon ring because the sublimation temperature of an organic material having a 6-membered carbon ring is much lower than the growth temperature of the carbon nanotube. Specifically, carbon nanotubes require an approximate temperature of 400°C in order to grow. In stark contrast, organic materials having 6-membered carbon rings have a sublimation temperature of approximately 200°C to 300°C.

Thus, if one skilled in the art attempted to grow a carbon nanotube on a substrate of an organic material having a 6-membered carbon ring, the substrate would decompose or sublimate before growth is completed. Decomposition or sublimation would occur regardless of the carbon nanotube growth method employed, including the method disclosed by Awano '507.

Furthermore, Applicants submit that the present invention achieves superior and unexpected results over the prior art of record. By utilizing a carbon nanotube in contact with an organic material having a 6-membered carbon ring, and a metal in contact with a part of the carbon nanotube, wherein the organic material and the metal do not directly contact each other, the present invention significantly improves the electric conductivity between the metal and the organic material having a 6-membered carbon ring.

Evidently, the cited references, alone or in combination, fail to render the present invention obvious. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

Conclusion


All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and objections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Vanessa Perez, Reg. No. 61,158, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: DEC 2 2008

Respectfully submitted,

By 

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Enclosure: Declaration Under 37 C.F.R. 1.132 (executed on November 12, 2008)